

STUDENT ENGAGEMENT MATERIALS



QUANTOPIA: THE EVOLUTION OF THE INTERNET

A Multimedia Hip Hop Concert Experience About the History and Exponential Growth of the Internet, Commissioned by The Internet Archive

Composed and performed by Paul D. Miller aka DJ Spooky

Visual design by Greg Niemeyer

Additional visual design by MEDIUM Labs and Roger Antonsen

Featuring Classical Revolution
and San Francisco Girls Chorus, conducted by Valérie Sainte-Agathe

QUANTOPIA SCHOOL DAY PERFORMANCE

January 25, 2019 at 11:00am

Yerba Buena Center for the Arts, 700 Howard Street, San Francisco, CA 94103

Commissioned by Internet Archive
with major support from William and Flora Hewlett Foundation.
Presented in association with YBCA, and produced by Sozo Artists
with additional support from Sozo Impact, Inc.





THE INTERNET ARCHIVE is located at 200 Funston Avenue (btwn Clement and Geary) in San Francisco. archive.org

The Internet Archive welcomes you to the school day performance of **QUANTOPIA: THE EVOLUTION OF THE INTERNET** — a multimedia hip hop concert experience about the history and exponential growth of the Internet. A grant from the Hewlett Foundation enabled the Internet Archive to commission composer Paul D. Miller to create QUANTOPIA: THE EVOLUTION OF THE INTERNET. In art, a commission is the act of requesting the creation of a piece, on behalf of yourself or another party.

“The idea of having a symphony about the web, can we go and learn from that in new and different ways what this Internet thing is?”

— Brewster Kahle, Founder and Digital Librarian, Internet Archive

VIDEO: Hewlett 50 Arts Commissions: DJ Spooky and the Internet Archive’s QUANTOPIA: THE EVOLUTION OF THE INTERNET
<https://archive.org/details/DJSpookyInternetArchiveFinal>

The Internet Archive is a non-profit digital library founded by Brewster Kahle in 1996 with the mission to provide “Universal Access to All Knowledge.” The organization seeks to preserve the world’s cultural heritage and to provide open access to our shared knowledge in the digital era, supporting the work of historians, scholars, journalists, students, the blind and those with disabilities that impact reading, as well as the general public.

PAUL D. MILLER aka DJ SPOOKY, COMPOSER / PERFORMER

“Djing is the collecting of archival works; it’s about collage and appropriation.”

— Paul D. Miller aka DJ Spooky



In an interview with [San Francisco Classical Voice](#), composer **Paul D. Miller aka DJ Spooky** refers to the influence that composers Meredith Monk, Phillip Glass and Steve Reich had on his new work, QUANTOPIA. Paul’s composition also employs a diverse range of voices, string instrument, digital sounds and human voices. *Quantopia* comments on the different ways that humanity has passed important information through the classical traditions of musical notation and composition and the oral tradition which has passed knowledge of spirituals such as *Amazing Grace*, *Go Tell It on The Mountain* and *Go Down, Moses* from generation to generation. Paul adds that “African-American culture is one of the traditions I’m coming out of. The African-American human voice had to engage with expression based on suppression.” He also chooses a female voice to present text from the Universal Declaration of Human Rights, to remind us that “all humans are born free and equal in dignity and rights,” with a “sense of openness, as oppose to assertiveness.” Paul speaks of pulling together unexpected worlds through his musical composition. “It’s about synthesis. That’s where the quantified self is: in a lyrical representation of the data that represents you. It’s an eerie portrait of what you are and what you do”

QUANTOPIA is presented in three movements:

Movement I: Mimesis - De Revolutionibus

Movement II: Diegesis - Roots, Routes, Rights

Movement III: Elpis - Polygon Chaos

“*Mimesis*” comes from the Ancient Greek word *μίμησις*, meaning “to imitate,” referring to the representation of aspects of the real world, especially human actions, in literature and art. “*Diegesis*” comes from the Ancient Greek word, *διήγησις*, meaning “to narrate.” In Greek mythology, *Elpis* (Ancient Greek: ἐλπίς) is the personification and spirit of hope.

QUANTOPIA, Movement I: Mimesis - De Revolutionibus

DJ Spooky describes QUANTOPIA as “an acoustic portrait of the Internet.”

STUDENT ACTIVITY: Listening Library

Listen to snippets of musical material that inspires composer Paul D. Miller aka DJ Spooky.

- *Amazing Grace* by Mahalia Jackson
https://archive.org/details/cd_amazing-grace_mahalia-jackson
- *Go Tell It On The Mountain* by Bayard Rustin
https://archive.org/details/cd_the-singer_bayard-rustin/disc1/15.+Bayard+Rustin+-+Go+Tell+It+On+The+Mountain.flac
- *Go down Moses* by Paul Robeson
https://archive.org/details/78_go-down-moses_paul-robeson-lawrence-brown-h-t-burleigh_gbia0045496a
- *Exclusive Selection: City Life* by Steve Reich Ensemble
https://archive.org/details/cd_exclusive-selection_steve-reich-bob-becker-james-preiss-bradle
- *Reich Remixed: City Life* by DJ Spooky
https://archive.org/details/cd_reich-remixed_steve-reich

STUDENT ACTIVITY: An Acoustic Self-Portrait

What music best represents you? Make a list of songs that reflects aspects of your unique self. Will you choose songs that you have listened to across the span of your lifetime or create a personal soundtrack that concentrates on a particularly special moment in your life time? Give your musical archive a title and create a logo for your musical collection. Provide metadata for each of your tracks.

In its most basic sense, metadata is information about data, and describes basic characteristics of the data, such as

- Who created the data
- What the data file contains
- When the data were generated
- Where the data were generated
- Why the data were generated
- How the data were generated

—*Stanford Libraries: Creating metadata*

<https://library.stanford.edu/research/data-management-services/data-best-practices/creating-metadata>

STUDENT ACTIVITY: Preserving Musical Memory

If you could choose to preserve a song in the Internet Archive for the future, what one song would you choose to archive? Do a search on the Internet Archive and see if your musical memory has been preserved for the future.



More on the Internet Archive:

- The Internet Archive's *Great 78 Project* is a community project for the preservation, research and discovery of 78rpm records. From about 1898 to the 1950s, an estimated 3 million sides (~3 minute recordings) have been made on 78rpm discs. 78s were mostly made from shellac, i.e., beetle resin, and were the brittle predecessors to the LP (microgroove) era. The format is obsolete, and just picking them up can cause them to break apart in your hands. There's no way to predict if the digital versions of these 78s will outlast the physical items, so we are preserving both to ensure the survival of these cultural materials for future generations to study and enjoy.
<https://great78.archive.org/>

STUDENT ACTIVITY: Create a Timeline of Technology

Greg Niemeyer's visual design for QUANTOPIA creates a barcode forest of media preserved in the Internet Archive. The audience witnesses fifty years, from 1969 to 2019, to consider the social, technical, and cultural events that have influenced the evolution of Internet.

What are the social, cultural and technological events that have influenced you life? What kinds of technology would you like to see developed in the future? How do you think the Internet might be changed for the better?



More on the Internet Archive:

- The Incredible Machine (1968)
https://archive.org/details/0767_Incredible_Machine_The_20_26_47_0_0
- [Sunset Tower Records, Los Angeles] (1971) by Darryl Forney, Center for Sacramento History
https://archive.org/details/casacsh_000018
- Apple Macintosh Business Computer (1984)
https://archive.org/details/Business_Computer
- YouTube on the tube! (2005)
<https://archive.org/details/youtube-rdwz7QiG0lk>
- Apple iPhone Ad Facebook (2007)
https://archive.org/details/Apple_iPhone_Ad_Facebook
- Design is [Simulation] – VR & AR Event Highlights (2017) by Google Design
<https://archive.org/details/youtube-0W4SadQ0rwM>

QUANTOPIA, Movement II: Diegesis - Roots, Routes, Rights

On December 10, 1948, the United Nations General Assembly adopted the Universal Declaration of Human Rights. These common human rights standards remain relevant today and resonate in our daily life.

VIDEO: UN Human Rights - UDHR @ 70: The History
<https://youtu.be/uA1IZkWycMk>

Movement II of QUANTOPIA features text from Article 19 of the **UN Declaration of Human Rights**, presented in English, as sung by mezzo-soprano Eve Orenstein, and binary code, the two-symbol system which uses the numbers “0” and “1”.

Here's the text of **Article 19**, written in English:

Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers.

Here is the same text written in binary code:

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01000101 01110110 01100101 01110010 01111001 01101111 01101110 01100101 00100000
01101000 01100001 01110011 00100000 01110100 01101000 01100101 00100000 01110010
01101001 01100111 01101000 01110100 00100000 01110100 01101111 00100000 01100110
01110010 01100101 01100101 01100100 01101111 01101101 00100000 01101111 01100110
00100000 01101111 01110000 01101001 01101110 01101001 01101111 01101110 00100000
01100001 01101110 01100100 00100000 01100101 01111000 01110000 01110010 01100101
01110011 01110011 01101001 01101111 01101110 00111011 00100000 01110100 01101000
01101001 01110011 00100000 01110010 01101001 01100111 01101000 01110100 00100000
01101001 01101110 01100011 01101100 01110101 01100100 01100101 01110011 00100000
01100110 01110010 01100101 01100101 01100100 01101111 01101101 00100000 01110100
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01101001 01101110 01101001 01101111 01101110 01110011 00100000 01110111 01101001
01110100 01101000 01101111 01110101 01110100 00100000 01101001 01101110 01110100
01100101 01110010 01100110 01100101 01110010 01100101 01101110 01100011 01100101
00100000 01100001 01101110 01100100 00100000 01110100 01101111 00100000 01110011
01100101 01100101 01101011 00101100 00100000 01110010 01100101 01100011 01100101
01101001 01110110 01100101 00100000 01100001 01101110 01100100 00100000 01101001
01101101 01110000 01100001 01110010 01110100 00100000 01101001 01101110 01100110
01101111 01110010 01101101 01100001 01110100 01101001 01101111 01101110 00100000
01100001 01101110 01100100 00100000 01101001 01100100 01100101 01100001 01110011
00100000 01110100 01101000 01110010 01101111 01110101 01100111 01101000 00100000
01100001 01101110 01111001 00100000 01101101 01100101 01100100 01101001 01100001
00100000 01100001 01101110 01100100 00100000 01110010 01100101 01100111 01100001
01110010 01100100 01101100 01100101 01110011 01110011 00100000 01101111 01100110
00100000 01100110 01110010 01101111 01101110 01110100 01101001 01100101 01110010
01110011 00101110
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STUDENT ACTIVITY: KNOW YOUR RIGHTS: THE UDHR

The Universal Declaration of Human Rights (UDHR) is a milestone document in the history of human rights. Drafted by representatives with different legal and cultural backgrounds from all regions of the world, the Declaration was proclaimed by the United Nations General Assembly in Paris on December 10, 1948 as a common standard of achievements for all peoples and all nations. It sets out, for the first time, fundamental human rights to be universally protected and it has been [translated into over 500 languages](#).

This illustrated edition of the **Universal Declaration of Human Rights (UDHR)**, featuring illustrations by Yacine Ait Kaci (YAK) is published by the United Nations and can be read in Arabic, Chinese, English, French, Russian, and Spanish.
<http://www.un.org/en/udhrbook/index.shtml>

STUDENT ACTIVITY: NUMERACY

Numeracy is the ability the ability to use numbers and solve problems in real life. It means having the confidence and skill to use numbers and mathematical approaches in all aspects of life. Numeracy is as important as literacy. In fact, it's sometimes called 'mathematical literacy'.

National Numeracy: <https://www.nationalnumeracy.org.uk/what-numeracy>

In 1679, German mathematician Gottfried Leibniz created a system that didn't use our normal ten digits, 0 to 9. Instead it used just two: 0 and 1. Leibniz called his code 'binary', and imagined a mechanical calculator, in which marbles could fall through an open hole to represent one and remain at a closed hole to represent nought. This calculator was never built, but Leibniz's idea paved the way for the whole history of computing.

Try spelling your name using UTF-8 binary code with Science Friday's binary text key. Find the 8-bit binary code sequence for each letter of your name, writing it down with a small space between each set of 8 bits. For example, if your name starts with the letter A, your first letter would be 01000001.

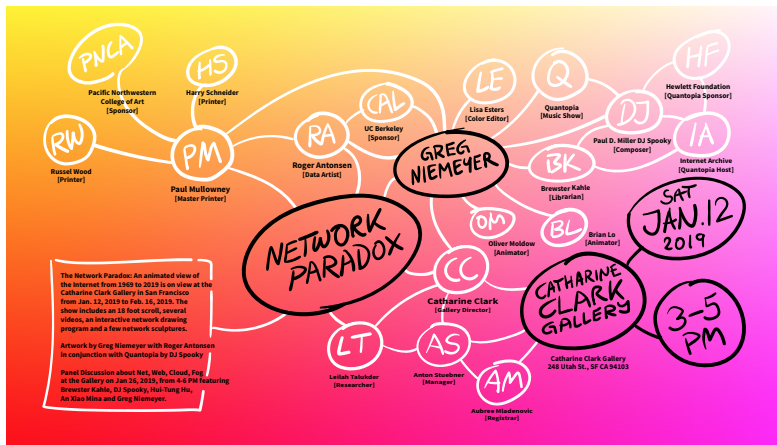
If you would like a real challenge, try translating a favorite quotation into binary.

<https://www.sciencefriday.com/educational-resources/write-your-name-in-binary-code/>

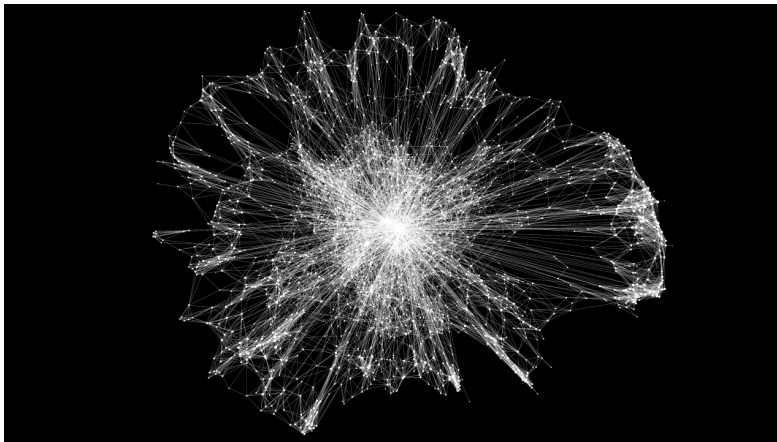
STUDENT ACTIVITY: VISUALIZING NETWORKS

In *Quantopia*, digital artist Greg Niemeyer and computer scientist Roger Antonsen explored the idea of networks through their art.

A network can be depicted through a graph of **nodes** (which can represent a wide range of objects, from cells to stars to people) while the connections between them are referred to as **edges**.



Greg Niemeyer's postcard for "The Network Paradox," an art exhibition inspired by DJ Spooky's QUANTOPIA, graphs the people (nodes) who are involved with the art show and their relationship to each other (edges).



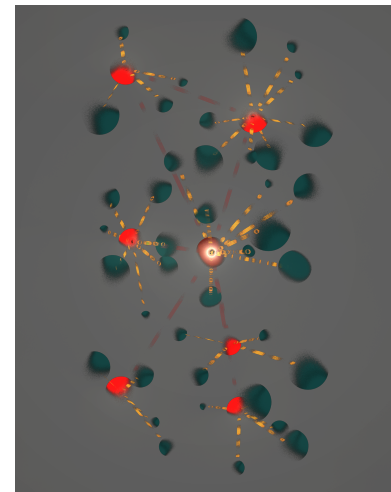
Computer Scientist Roger Antonen created an application that helps us to see how networks are formed and how they are destroyed. Imagine that each node in this image called *Networks Forming* represents a website, or perhaps a social media user.

STUDENT ACTIVITY: Map Your Network

Try creating a graph of your own personal network. Start with yourself and depict family and friends as a node. Indicate the edges to show how everyone is connected. Find your own way to depict special relationships through use of color or line. Be sure to create a key for your graph that helps others to decode and interpret the meaning behind your Network graph.

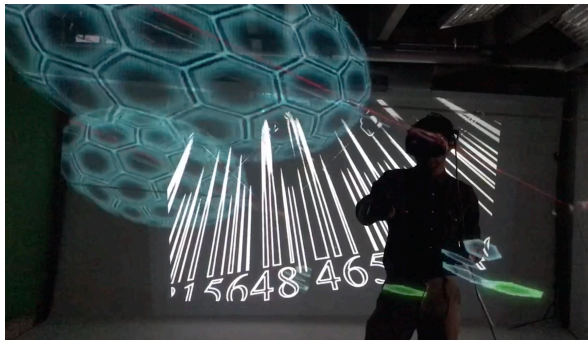
Networks: Graph Theory Overview

<https://youtu.be/82zIRaRUsaY>



QUANTOPIA, Movement III: Elpis - Polygon Chaos

From microphones to microprocessors, technology offers users new perspectives on the world. The Virtual Reality (VR) experience in QUANTOPIA helps to put the viewer (audience or participant) inside a network, immersing them in the vast and complex digital world that we are all a part of. In performance, Paul is “remixing” the network in a sense, creating a musical and visual immersion.



Paul D. Miller aka DJ Spooky tests out the new DJ gear developed in collaboration with MEDIUMLABS, a Virtual Reality production company that specializes in creating virtual and augmented reality apps, incredible 360° video, augmented reality video installations, mixed reality videos, and cutting-edge experiences. <https://vimeo.com/306082326>



In Greek mythology, *Elpis* is the personification and spirit of hope. She was depicted as a young woman, usually carrying flowers or a cornucopia in her hands.

Elpis depicted on a bronze coin struck in Alexandria, 284-285 AD.

STUDENT ACTIVITY: THE FUTURE OF MUSIC

Imagine what music might look like 50 years from now and design your own Instrument of the Future. How would the instrument be played? What would it sound like? Sketch or build your design. Explain how your instrument works. Maybe even try writing a new song about the future of music.



More on the Internet Archive

- *The History of Musical Instruments* (1940) by Curt Sachs
A comprehensive history of musical instruments ranging from prehistoric times to the 20th century and traverses five continents and every stage of evolution, from primitive rattles and bull-roarers to the electric organ.
https://archive.org/details/the_history_of_musical_instruments_curt_sachs



AN INVITATION TO STUDENTS & EDUCATORS:

Please share your ideas and work inspired by QUANTOPIA with the Internet Archive and DJ Spooky by using the hashtag **#quantopia** on social media or by emailing info@archive.org.



INTERNET ARCHIVE

300 Funston Avenue
San Francisco, CA 94118
Tel: 415-561-6767
Fax: 415-840-0391
Web: archive.org
Email: info@archive.org